OIL ELECTRIC TRANSPORTATION

By R. TOM SAWYER, '23

$1.00 an hour in fuel cost alone is saved by using the oil electric locomotive in yard switching service. Many more dollars are also being saved by using the gas electric railroad car and bus.

Here are the results of the past year, the results which hardly anyone could believe when first predicted.

Today it is being proved that there is no self contained unit with greater flexibility and ease of operation, particularly at such a low operating cost. This engine electric drive is the greatest egg that has ever hatched in the transportation nest. But remember—this egg was hatched twenty years ago, in the days of the old type gas electric cars. In this time it has had its ups and downs, but has now shed its pin feathers. Its new feathers now stretch over a vast field, a field so varied, so unlimited that many great corporations in this country are very keenly interested in its finance and production.

The Oil Electric Locomotive.

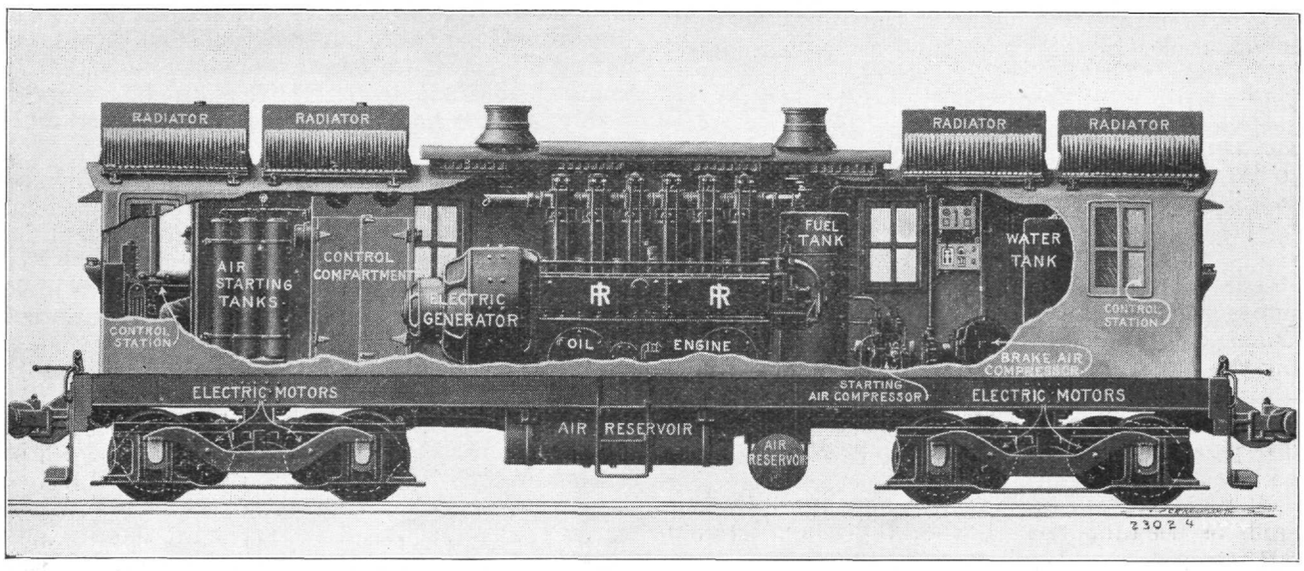
The Central Railroad of New Jersey purchased the first successful oil electric locomotive in this country. It is a 60 ton locomotive having a starting tractive effort of 36,000 pounds. The engine was built by the Ingersoll Rand Company, and is of the type which injects the fuel oil directly into the cylinders, thereby operating at a variable speed on a combination Otto and Diesel cycle. It has 6 cylinders, is 4 cycle, and develops 300 horse power at 600 revolutions per minute. The locomotive cab is built by the American Locomotive Company. The electric generator, directly connected to the engine, and which drives the four motors on the axles, is produced by the General Electric Company. This electrical equipment is very rugged, simple and entirely automatic. The operator has three levers to handle, the air brake, the reversing handle, and the engine throttle. In operating, the throttle is opened wide and electric power is thus delivered automatically to the wheels.

This locomotive is operating at the Bronx Terminal, pulling cars off of a float and placing them. It went into service on October 20th and since then has been out of service a total of but 7 hours and 40 minutes. Up to April 1st it has been operating on an average of 13 fuel consuming hours each working day. It uses on an average 3.5 gallons of fuel oil per hour. Every fourth week the crank case is drained and 30 gallons of fresh lubricating oil are put in. Fuel and lubricating oil and extras come to 23 cents per operating hour.

Later the Baltimore & Ohio and the Lehigh Valley Railroads each purchased a 60-ton locomotive, the same type as the first one, and to do the same kind of work. These two locomotives are operating in two adjacent yards at the west end of 26th street on Manhattan Island. They have been operating since Christmas with similar saving in fuel costs. The longest delay on the two locomotives was 3 hours and 40 minutes and that was the only delay on the Baltimore & Ohio locomotives.

The Long Island Railroad bought the first single cab, double unit oil electric locomotive in the world. This locomotive went into regular 24-hour switching service this February 15th. On its run from Erie, Pa., to Jersey City it took a total running time of 28.73 hours, the engines running continuously. It pulled a train of 376 tons a total of 537 miles at a fuel cost of $26.15, or 5 cents per mile. The first 60-ton locomotive was run down from Erie, Pa., light at a fuel cost of 1.5 cents per mile. This double unit locomotive in switching service averages 22.2 fuel consuming hours per day at an average of $.45 per hour. This locomotive weighs 100 tons and has a starting tractive effort of 60,000 pounds. The two units in this locomotive are each identically the same as the one unit used on the 60-ton locomotives. The main object of a double unit is to insure dependability.

These are the first 4 oil electric locomotives to



DOUBLE UNIT 100-TON OIL ELECTRIC LOCOMOTIVE

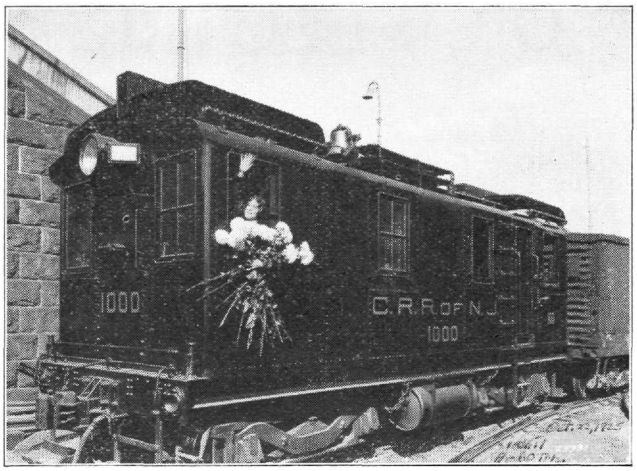
be sold and put into operation in this country. The American Locomotive Company is now building several more of these locomotives, which will be used by railroads principally around New York and Chicago. The Baldwin Locomotive Works has built to date the largest oil electric locomotive in this country, 1000 horse power, using a 2 cycle solid injection Knudson engine. This locomotive is the first one built by them and is still in the experimental stage as none have been sold. The Canadian National Railways startled the world by making a transcontinental run at passenger train speed with their first oil electric car. They use a Beardmore oil engine of extremely light weight, built in Scotland. Two sizes of cars are now being built, one using a 4 cylinder engine, the other an 8 cylinder in line engine, 300 horse power. The electric equipment is in proportion and is of the balanced type. This is the first successful oil electric car on this continent and marks the beginning of a great future for this service. The New York Central Railroad has ordered two oil electric locomotives; one for freight service which contains one 750 horse power Ingersoll Rand engine, and one for passenger service which contains one 800 horse power McIntosh Seymour Diesel engine.

It is interesting to note that these American locomotives are purely American in design, although foreign built engines have been seriously considered. Electrically the American design is much preferred and we should have every confidence in the American engine. American locomotives up to 3000 horse power are now being designed.

The Gas Electric Railroad Car.

The Gas Electric Railroad Car is fast coming into its own. Fifty-eight were sold in 1925; forty-six by one company alone. A motor car and trailer is taking the place of the steam engine, hauling a baggage car and two passenger coaches at a remarkable overall saving. Due to the great variety of service, exact figures cannot be quoted, but they range from one-fifth to one-half as much as steam operation. That is the gas electric replaces steam trains which cost $.85 to $1.50 per mile, which includes fuel, labor, and all other expenses. The gas electric in this same service costs from 30c to 40c per train mile.

It is of interest to compare the ratios between the gas electric car and the mechanical direct driven car. The weight of the gas electric car is only a little more than the direct driven car. Its first cost is about one-third more than the direct driven car. The fuel cost of the gas electric is only four-fifths as much for the same work done. The gas electric is available for service, according to a general average of all cars out, 94% of the time. Most of the old gas electric cars built between 1905 and 1910 are in daily operation and still with a yearly maintenance cost of only 10% of their original cost. The old McKeen and other mechanical cars did not have that long life, and were not expected to. When all types of railroad service and operators are to be considered, the flexibility, simplicity of operation and long life unquestionably call for the electric balanced driven car. If these cars used an oil engine instead of a gas engine their saving would be even greater. But for passenger service where light weight and rapid acceleration are desired, the gas



America's first Oil Electric Locomotive

engine will be the solution for many years yet to come.

The Gas Electric Bus and Auto.

The greatest indirect competitor of the steam locomotive is also turning to the electric drive, the bus and the auto. The gas electric bus is a splendid success; the gas electric auto is seriously being considered. The auto and electrical industries started and have progressed together; but still only 10% of the selling cost of an auto is electric equipment. In 1904 the first gas electric transmission was used. That was on a Fifth Avenue bus. Other buses and autos that followed, using the electric drive, proved also too complicated in construction and operation. And after these many years of development a wonderfully simple and flexible drive has been put on the market. This drive consists of a generator directly connected to the engine and this power plant may be located in any position to conform with the most economical and attractive body design. One, two, or four driving motors may be used depending upon the service requirements.

Close to 1000 gas electric buses have been ordered in the past two years. The results show that at the end of the days run more miles are covered and with greater comfort in this gas electric than the direct mechanical driven bus. It also shows that on an average, slightly less gasoline is used per mile, but great economies in lubricating oil. And we unquestionably know that by using the electric drive the life of the bus is appreciably greater and the cost of maintenance much lower.

How can we account for these facts when we know the direct mechanical drive is more efficient? The direct mechanical drive is more efficient but only at a few definite engine car speeds. The electric drive in this case is not a direct drive but a balanced drive which has a lower but approximately constant efficiency. Therefore it has as good overall efficiency as the direct mechanical drive. With this electric drive the engine speed has practically no relation to the speed of the car. With the direct drive the speed of the engine varies directly with the speed of the car and delivers power only according to the speed of the car at that moment. Electrically the motors automatically sort out the best ratio of work and

(Continued on Page 30)

OIL ELECTRIC TRANSPORTATION

(Continued from Page 12)

speed which, combined, make the full capacity of the power plant at that moment. Each moment its combination is different, but is always balanced to the best efficiency.

Years ago men dreamed of a car which had unlimited power, flexibility, and ease of operation. Years of experience developed the storage battery car. It fulfilled all hopes except for speed and continuous operation. A new era developed which is now bringing forth four million gas cars each year. But these cars do not hold all the high standards laid down for the ideal car. The ideal bus is now being perfected. The ideal car will certainly be the gas electric. For any power, speed, or flexibility you only have to push down on the gas.

Let us turn back the pages of time. Just one century ago the interest of the people was attracted by an entirely self contained, self propelled vehicle, the steam locomotive. And today we have brought forth a second entirely self contained, self propelled vehicle, a direct competitor of the steam locomotive. Now we have three types of locomotives, the steam, the electric and the oil electric, each used to its best advantage will certainly lead to a much higher efficiency in our great national transportation system. And due to these past twenty years of trials and tribulations we have also brought forth what may prove to be the ideal railroad car, bus and auto; the gas electric.